to backfilling areas where soils have been removed for treatment. Construction activities will be performed to minimize disturbance of contaminated soils. Furthermore, fugitive dust will be controlled during construction activities by water sprays or dust control chemicals.

5. **Diversion and Lining of the Unnamed Stream**

This component of the selected remedy is limited to the portion of the unnamed stream parallel to the eastern boundary of the site. This component consists of the following: limited clearing of areas adjacent to the unnamed stream portion, temporary diversion of surface waters, excavation of sediments, concrete lining of the stream portion, rediversion of surface waters.

Initially, only those areas necessary for implementation and construction of this component will be cleared of shrubs and trees. Cleared material will be disposed of on-site within excavated areas. Surface waters of the portion of the stream to be lined with concrete will be temporarily diverted until the concrete channel is constructed and the surface waters can be redirected back through the new channel. The whole length of the unnamed stream and its tributaries up to the first and second water hazards will be excavated to remove the contaminated sediments (see Figure 6). Next, the portion of the unnamed stream parallel to the eastern border of the site will be lined with concrete to form a concrete channel. The concrete channel will prevent the waters of the unnamed stream from being pulled into the extraction wells described in the next component. The concrete channel will be constructed with a series of baffled sections to reduce stream velocities and maximize sediment deposition. After completion of the concrete lining, the unnamed stream will be directed back to the new channel.

Figure 5 shows the portion of the unnamed stream which will be excavated, diverted and lined. This portion of the stream is approximately 750 feet in length from the culverts at the southern boundary of the site up to the culverts at Hathaway Road.

The method of stream diversion will be finalized during design of the selected remedy. In view of the need to mitigate wetland impacts, EPA has determined that the diversion method of digging a temporary trench on the east or west bank of the unnamed stream will be re-evaluated during remedial design. If deemed feasible, the portion of the unnamed stream to be contained within the concrete channel will be diverted and/or pumped through a temporary pipe located in close proximity to the existing streambed.

The stream diversion structure and ancillary activities will be performed to mitigate adverse impacts to the wetlands, as described in component 7 of the selected remedy.

6. **Collection and Treatment of On-site Groundwater**

With this component of the preferred alternative, EPA will combine two phases of groundwater collection: active groundwater collection and passive groundwater collection.

A. Active Groundwater Collection

This component is composed of the following: predesign pump tests; extraction wells; hydrofracturing or blasting (to increase hydraulic connection with the pits); groundwater pumping; groundwater treatment and groundwater monitoring. Approximately 6 deep bedrock extraction wells at least six inches in diameter will be installed to depths as great as 200 feet. The cumulative pumping rate is expected to be 30 to 60 gallons per minute. A conceptual location map is presented in Figure 11-7(FS). The specific number, depth, pumping rates and location of the extraction wells will be defined during design as directed by predesign investigations. The wells will be located as close as possible to the quarry pits so they are hydraulically connected to the pits. Hydrofracturing or blasting may be performed on individual boreholes to supplement the hydraulic connection between the boreholes and the pits. During design the extent of hydrofracturing or blasting will be defined as directed by predesign investigations. Treatment of the extracted ground water is discussed in Section X.A.6.C.

Predesign work includes pump tests, groundwater sampling and subsurface exploration to define pit boundaries. Pump tests will be performed to determine well yields. This information will be used to evaluate the extent to which hydrofracturing or blasting will be used and to define the safe yields for individual wells. Consideration of extracted groundwater disposal and impacts of surrounding wetlands (ie. dewatering) will be incorporated into pump test design. In addition, as part of the predesign program associated with the pump tests, subsurface investigations to refine the present delineation of the quarry pits will occur to assist in locating extraction wells.

Groundwater monitoring of the overburden, shallow and deep bedrock will occur during the implementation of the active groundwater collection system. Chemical concentrations and water elevations will be monitored to evaluate the efficiency of the extraction system. The frequency of monitoring will be finalized during design; however, it is expected that monitoring wells will be sampled on a quarterly schedule. The specifics of this monitoring program will be defined during design but, at a minimum, will include the multilevel Westbay Systems installed during the Remedial Investigation. In addition, pumping rates of each well and the treatment and extraction system influent and effluent concentrations will be monitored with the objective of defining the mass of contaminants extracted over the life of the system.

Once the clean up targets, as defined in Section X.B.3.a., have been satisfied, the extraction wells will be shut down and a monitoring program will be implemented to confirm the results. This program will, at a minimum, consist of three years of quarterly monitoring of groundwater quality. Monitoring wells to be sampled will be identified in the overburden and deep and shallow bedrock. These wells will be wells that had been historically monitored during the operation of the extraction system. Additional specifics of this monitoring program will be defined in the remedial design. The results of this monitoring will be reviewed by the EPA to evaluate the success of the extraction system and determine if and when it should be reimplemented. The monitoring results from this program ultimately serve two purposes: first to evaluate the success of the remedy and second to help define the extent of the institutional controls.

B. Passive Groundwater Collection

This component of the remedy is composed of the following: excavation; installation of the underdrain pipe; and water treatment and monitoring. The excavation depth for the underdrain installation will extend to the top of the bedrock surface. The underdrain itself will be composed of a 12-inch slotted pipe wrapped in geotextile fabric and backfilled in graded stone (see Figure 11-2A FS). The expected flow rate for the underdrain pipe is approximately 35 gallons per minute. Specifics of the underdrain will be defined in the remedy design and modified depending on predesign data. The location of the underdrain will also be defined in the remedial design, but presently it is expected to be located just beyond the cap boundaries as shown in Figure 11-3 (FS). Treatment of the extracted water is discussed below in Section X.A.6.C.

Predesign work is the same for the passive system as it is for the active system. Of specific note are the pump tests performed in conjunction with the active groundwater system.

These results will define the impact of the active system on overburden flow and help define expected flow rates for the passive system.

Installation of the passive system will be impacted by the implementation of the cap and the active ground water extraction system. Since the underdrain is to be installed at the boundary of the cap, the time of its installation will depend upon that of the cap. Consideration of the appropriate implementation sequence of these components of the remedy will be given in the remedy design.

Monitoring of the flowrate and sampling and analysis of the water collected by the passive system will occur before and after treatment, at a minimum on a quarterly basis, with the objectives of defining the mass of contaminants removed by the system and compliance with the effluent limitations and groundwater target levels. Additional specifics of monitoring frequency and sampling parameters will be defined during remedial design.

Once the clean up target levels as specified in Section X.B.3.b., have been satisfied for two years, treatment of collected groundwater within the passive system will not be required; instead, monitoring will be implemented. The results of this monitoring will be reviewed by the EPA to determine if and when the passive collection system should be reimplemented.

C. Groundwater Treatment

The proposed groundwater treatment for both the active and passive collection systems consists of the following: bench-scale and pilot studies; oxidation/filtration for metals removal; ultraviolet (UV)/ozonation for organics removal and groundwater monitoring.

Chemical oxidants (i.e., potassium permanganate), combined with aeration and followed by filtration, will remove metals. Solids produced during the oxidation step will be concentrated and dewatered prior to disposal. If these solids are hazardous, they will be disposed of in a RCRA landfill. All hazardous wastes transported off-site will be done in accordance with RCRA and DOT regulations.

EPA has selected UV photolysis/ozonation as the water treatment component for organics. This is because UV/ozonation is an innovative treatment technology that destroys organic compounds in water through a combination of UV light and a mixture of ozone and hydrogen peroxide. A unit attached to the reactor collects any residual ozone and converts it to oxygen. UV/ozonation is a destruction technology and, therefore, will not require disposal of waste residuals. Treated groundwater will be discharged to the unnamed stream or, if deemed feasible, to the New Bedford secondary treatment plant.

UV/ozonation is an innovative technology which has been proven to be effective in the destruction of organic contaminants in groundwater. However, it will be necessary to conduct bench-scale treatability studies to determine the implementability of this technology on site-specific contaminants. If UV/ozonation, based on the results of the treatability studies, is not determined to be implementable or effective or is determined to be significantly more costly than other effective treatments, then EPA will select air-stripping with GAC and vapor phase carbon as the treatment technology for removal of organics in groundwater.

Since the levels of groundwater contaminants at the site are relatively high, and because UV/ozonation is an innovative treatment, pilot testing of UV/ozonation (if selected) will be required to determine the implementability of the groundwater treatment system on a full-scale level. The pilot study will yield information on the percent reduction of organic and inorganic compounds in groundwater and the volume and types of residuals and byproducts produced by the operation of the treatment system.

Monitoring of the flow rate and chemical analysis of groundwater entering and leaving the full-scale treatment plant will be evaluated during the operation of the treatment system to ensure that response objectives and effluent limitations are achieved.

The period of operation of the treatment plant will be determined by the achievement of the completion requirements specified for the active and passive systems. During the operation of the treatment plant, regardless of what technology is chosen, the effluent will have to comply with the effluent limitations, as described in Section X.B.3.c.

7. **Wetlands Restoration/Enhancement**

EPA has determined that there are no practicable alternatives to the soil excavation, sediment excavation and stream diversion and lining components of the selected remedy, that would achieve site goals but would have less adverse impacts on the aquatic ecsoystem. The contaminants in the soils and sediments would continue to pose unacceptable human health and/or environmental risks if excavation of the soils and sediments greater than the target levels were not performed.

Excavation of contaminated sediments and soils, lining of the stream and any ancillary activities will result in unavoidable impacts and disturbance to wetland resource areas. Such impacts may include the destruction of vegetation and the loss of certain plant and aquatic organisms. Impacts to the fauna and flora will be mitigated as discussed below.

During implementation of the remedy, steps will be taken to minimize the destruction, loss and degradation of wetlands, including the use of sedimentation basins. A wetland restoration program will be implemented upon completion of the remedial activities in wetland areas adversely impacted by remedial action and ancillary activities. In particular, the unnamed stream portions north of Hathaway Road will be restored to reasonably similar hydrological and botanical conditions existing prior to excavation. The concrete channel which will line the unnamed stream along the eastern boundary of the site will be constructed with a series of baffled sections to reduce stream velocities and maximize sediment deposition. Any additional wetland areas impacted by dredging and/or associated activities, including wooded areas to the north and east of the site, will be restored and/or enhanced, to the maximum extent feasible.

The restoration program will be developed during design of the selected remedy. This program will identify the factors which are key to a successful restoration of the altered wetlands. Factors may include, but not necessarily be limited to, replacing and regrading hydric soils, provisions for hydraulic control and provisions for vegetative reestablishment, including transplanting, seeding or some combination thereof.

The restoration program will include monitoring requirements to determine the success of the restoration. Periodic maintenance (i.e. planting) may also be necessary to ensure final restoration of the designated wetland areas.

8. **Long-term Environmental Monitoring and Five-Year Reviews**

For the reasons discussed in Section X.B.3., EPA considers it technically impracticable to clean the contaminated deep bedrock groundwater both on- and off-site to drinking water standards. Accordingly, a groundwater monitoring program focusing on deep bedrock groundwater and off-site overburden and bedrock groundwater will be implemented. The groundwater monitoring program will be designed for the following purposes:

a. to document the changes in contaminant concentrations over time;

b. to evaluate the success of remedial action; and

c. to help define the extent of institutional controls.

Because wastes in the pits would be left untreated, although capped, groundwater monitoring of wells adjacent to the pits will also be performed to determine changes in contaminant loadings and/or distribution.

The details of the on-site and off-site overburden and bedrock groundwater monitoring program will be developed during remedial design. The monitoring program will be tailored to site specific hydrogeologic conditions and contaminants. Wells will be sampled on a routine basis to evaluate dispersion of the contaminant plume and the distribution of contaminant migration. A list of a representative subset of approximately 50 existing monitoring wells to be monitored periodically will be generated. The frequency of monitoring will be finalized during design; however, it is expected that monitoring wells will be sampled and analyzed on a quarterly basis to improve the existing data base and establish contaminant concentrations. The proposed groundwater monitoring program will include sampling of the four existing multi-level bedrock wells (ECJ-1,2,3,4) during every sampling round. Five to eight zones will be sampled in each of the multi-level monitoring wells. Maintenance requirements will include replacement of the multi-level monitoring wells. During design, the condition and usefulness of existing wells will be checked and compared with future data needs. Recommendations on the installation of additional multi-level, overburden and/or bedrock monitoring wells will be specified during remedial design if deemed necessary to adequately monitor over a long term the nature and extent of groundwater contamination. Initially, all samples will be analyzed, at a minimum, for VOCs, SVOCs, PCBs and metals. Specific parameters may be added or deleted depending on sampling results and observed trends.

Environmental monitoring will also include sampling of sediments in the unnamed stream to indirectly check the integrity of the cap and solidified material in preventing mobility and transport of PCBs and PAHs. At a minimum, sediment samples will be initially monitored for PCBs, SVOCs, and total organic carbon.

All monitoring data will be formally reviewed and evaluated during the operation of remedial action to ensure that appropriate remedial response objectives are achieved. Monitoring frequency and chemical parameters may be added or deleted based on review of monitoring data. Five-year reviews will be initiated to ensure that human health and the environment are being protected by the remedial action being implemented. Future remedial action, including source control measures, will be considered if the environmental monitoring program determines that unacceptable risks to human health and/or the environment are posed by exposure to site contaminants.

9. **Institutional Controls**

Because the bedrock groundwater cannot be cleaned to drinking water standards and because wastes will remain in the pits, institutional controls will be necessary to achieve long term protectiveness. Institutional controls at this site will be designed: (i) to ensure that groundwater in the zone of contamination will not be used as a drinking water source; and (ii) to ensure that any use of the site will not interfere with the effectiveness of the cap in reducing exposure to contaminants. EPA will work with state and local officials to enact ordinances and zoning restrictions to prevent the use of groundwater for drinking water and to place deed restrictions regulating land use at the site. The effectiveness of the institutional controls will be re-evaluated during the 5-year reviews described above.

B. **Target Levels**

Based on results of the Phase I and Phase II risk assessments, target levels were developed for the following media: soils, sediments, groundwater.

1. Soil Target Levels

a. Soils within the Disposal Site

Soil target levels for soils located within the 12-acre disposal area were derived for PCB and PAH compounds. The target levels for PCBs are based on total Aroclors, while PAHs are based on total carcinogenic PAHs (these include benzo(a)anthracene, benzo(b) fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(ah)anthracene, and indeno (1,2,3-cd)pyrene.

Soil target levels for PCBs and PAHs are based on risks associated with direct contact to, and incidental ingestion of, indicator compounds detected in surface soils and test pit soils. The assumptions used to calculate soil target levels reflect the site zoning designation and current and future uses of the site. The current zoning for the site is commercial and access to the disposal area is restricted. The immediate surrounding area is not densely populated and the population is not expected to significantly increase. Two future land use scenarios for this land have been proposed: a parking lot or a soccer field.

Based on current land use at the site, target levels for PCBs and PAHs were estimated. Exposure parameters considered in the target level calculations were as follows:

- exposure by an older child (8 to 18 years)
- 45-kg body weight
- 12 exposures per year (twice per month from May through October)
- 10-year exposure duration
- 4 grams of soil contacted (represents arms, hands, and lower legs)
- relative absorption factors for PCBs and PAHs of 7 percent (dermal)
- ingestion of 0.1 grams of soil per exposure
- relative absorption factor for PCBs and PAHs of 50 percent (oral)

Because one of the possible future uses for this disposal area is a soccer field, target levels for PCBs and PAHs were also estimated to be protective against exposure conditions for this land use. It is assumed that concurrent exposure through direct contact and ingestion of soil occurs per exposure event. Exposure parameters considered for these calculations include the following:

- exposure by an older child (8 to 18 years)
- 45-kg body weight
- 48 exposures per year (twice per week from May through October)
- 10-year exposure duration
- 4 grams of soil contacted (represents arms, hands, and lower legs)
- relative absorption factors for PCBs and PAHs of 7 percent (dermal)

- ingestion of 0.1 grams of soil per exposure
- relative absorption factor for PCBs and PAHs of 50 percent (oral)

The disposal area soil remediation component of the selected remedial action entails excavation and treatment of soils contaminated with total PCBs at concentrations of 50 ppm or greater, and total carcinogenic PAHs at concentrations of 30 ppm or greater, located in the unsaturated zone. These clean-up levels correspond to a 10^{-5} risk level under current site use conditions and a 10^{-4} risk level under future site use conditions (soccer field) which falls within the target risk range of 10^{-4} to 10^{-7} considered for remediation at superfund sites. The potential risk will be further substantially reduced by the construction of an impermeable cap above the treated soils thus minimizing direct exposure to the contaminants. During the excavation and treatment of soil, air quality will be monitored to ensure that site specific ambient action levels are not exceeded.

It is important to recognize the inherent uncertainties in estimating the health-based soil cleanup levels. Uncertainties are associated with the value of each exposure parameter, the toxicological data base and the overall set of exposure assumptions. Despite these uncertainties, EPA believes that the assumptions used to estimate the cleanup levels are reasonable, and that it is necessary to use this approach, in order to ensure that the cleanup goals will be adequately protective of public health.

b. Soils outside the Disposal Area

Results of the off-site soil sampling program will be analyzed to identify contaminant levels in unsaturated soils for areas specified in Section X.A.2.

Incremental carcinogenic risks associated with exposure to contaminated surface soil in areas outside the disposal site have been estimated within the range of 10^{-5} to 10^{-9}. In particular, incremental carcinogenic risks for adults associated with dermal contact with soil outside the disposal area containing contaminants of concern at the mean and maximum concentrations were estimated at 2.7×10^{-7} and 4.9×10^{-7}, respectively. However, results of a limited number of soil sampling within the golf course were used in the calculations of these risks. EPA has determined that additional soil sampling is needed in areas immediately north and east of the site's disposal area. Therefore, a soil cleanup level for soils outside the disposal area has been established because the additional sampling may show greater contaminant levels than levels indicated in the RIs and because corresponding estimated risk values may be greater than a 10^{-5} risk.

Unsaturated soils in areas outside the 12-acre disposal area with PCB concentrations equal to or greater than 10 ppm will be excavated, transported to and disposed of within the site's disposal area. Unsaturated soils with PCB concentrations equal to or greater than 50 ppm will be solidified prior to disposal within the site's landfill area, consistent with the cleanup level for soils within the site's restricted disposal area, as described in the preceding section.

The soil cleanup level of 10 ppm of PCBs for soils outside the site's disposal area is based on a 10^{-5} incremental cancer risk associated with direct contact with contaminated soil. The cleanup level of 10 ppm is more stringent than the soil cleanup level of 50 ppm for soils within the 12-acre disposal area because soils outside the disposal area are located in nonrestricted areas resulting in greater frequency of exposure with these contaminated soils. In addition, soils outside the disposal area will not be covered with an impermeable cap which will cover the majority of the site's disposal area thus further minimizing exposure to the soils underlying the cap.

Excavated off-site areas will be backfilled with clean fill.

2. Sediment Target Levels

The sediment target level for the unnamed stream, its tributaries and the golf course water hazards is the interim mean sediment quality criteria (SQC) value of 20 micrograms of PCBs per gram of carbon (ug/gC). This value for PCBs has been derived by the EPA Criteria and Standards Division to protect uses of aquatic life, specifically the consumption of aquatic life by wildlife. The mean sediment quality criteria (20 ug PCBs/gC) was chosen as the cleanup level because:

a. For total organic carbon (TOC) of 10 gC/kg sediment, typically found in stream sediments, it represents the detection limit for analyzing PCBs in sediments.

b. After remediation, the resulting PCB concentrations in stream sediments represent levels which, with approximately 50% certainty, will result in interstitial water concentrations equal to or lower than the PCB ambient water quality criterion (final residue value of 0.014 ug/l).

c. Based on TOC sediment values between 10 gC/kg sediment and 20 gC/kg sediment, calculated SQCs from between 0.2 ppm PCBs and 0.4 ppm PCBs, respectively, compare favorably with the toxicological literature which documents examples of sublethal toxic effects in aquatic organisms at PCB tissue levels and hence sediment concentrations of less than 1 ppm and as low as 0.1 ppm PCBs.

The following table lists projected mean SQCs in ppm of PCBs.

TOC (gC/kg sediment)	Mean SQC Levels in ppm of PCBs
2 gC/kg sediment	0.04 ppm PCBs
5 gC/kg sediment	0.1 ppm PCBs
8 gC/kg sediment	0.16 ppm PCBs
10 gC/kg sediment	0.2 ppm PCBs
15 gC/kg sediment	0.3 ppm PCBs
20 gC/kg sediment	0.4 ppm PCBs

EPA considered two additional factors: the detection limit for analyzing PCBs in sediments and background levels. The Contract Lab Protocol (CLP) detection limit for the analysis of PCBs in sediments is 0.16 ppm. The background PCB level at this site has been estimated at approximately 0.14 ppm. Therefore, EPA has determined that the sediment target levels in ppm of PCBs for sediments with TOC values less than or equal to 10 gC/kg sediment will be 0.2 ppm of PCBs. Where TOC values are greater than 10gC/kg sediment, the calculated mean SQC will be the target level. Therefore, target levels are as follows:

TOC (gC/kg sediment)	Final Sediment Target Levels in ppm PCBs
2-10 gC/Kg sediment	0.2 ppm PCBs
15 gC/Kg sediment	0.3 ppm PCBs
20 gC/Kg sediment	0.4 ppm PCBs

3. Groundwater Target Levels

EPA has determined that contaminants from the quarry pits have contaminated on- and off-site groundwater and surface water in the unnamed stream. In particular, high levels of VOCs detected in groundwater located in bedrock fractures indicate that pockets of highly-contaminated liquid waste may exist within the pits and along bedrock fractures. For this site, EPA considers it technically impracticable from an engineering perspective to clean up the contaminated deep bedrock groundwater to Maximum Contaminant Levels (MCLs) promulgated under the Safe Drinking Water Act, and Massachusetts Drinking Water Standards. The basis for this determination of technical impracticability is discussed in Section XI.B.

Instead of MCLs, EPA has determined that the cleanup goals for groundwater at this site are the significant reduction of contaminant mass in the aquifer and the protection of local surface water bodies. A two-part plan for cleanup of on-site contaminated groundwater and seeps is presented. It involves an active extraction system to collect contaminated groundwater located in and adjacent to the pits and a passive collection system to collect seeps and contaminated overburden groundwater.

A groundwater treatment system would be operated to treat collected groundwater.

a. Active Collection System Cleanup Levels (In the Aquifer)

The cleanup goal for the active collection system is the significant reduction in the mass of bedrock contamination.

EPA will evaluate achievement of this cleanup goal by using two criteria : (1) a concentration range of 1 to 10 ppm of total volatile organic compounds (VOCs): and/or (2) an asymptotic curve using groundwater monitoring data indicating that significant concentration reductions are no longer being achieved. The groundwater monitoring data curve will be asymptotic when the rate of change in contaminant levels approaches zero, with no statistically significant deviation.

These two criteria will be evaluated together to determine when a significant reduction of contaminants has occurred. Given the complexities of the Sullivan's Ledge system, EPA will modify the range of 1 to 10 ppm of total VOCs if necessary upon review of actual full-scale treatment performance data. Monitoring data will be reviewed to assess the practicability of achieving or exceeding 1 to 10 ppm of total VOCs. This data will be evaluated against the asymptotic curve standard by comparing contaminant concentrations against time at a number of monitoring wells. If new monitoring data indicates that either achieving the 1 to 10 ppm VOC concentrations is impracticable, or that achieving groundwater concentrations lower than 1 to 10 ppm is practicable, then the ROD will be amended. The asymptotic curve must be demonstrated for one year (four consecutive quarters), at a minimum, during the operation of the pumps before the pumps can be shut off. After the shutdown of the active pumping system, monitoring data will be evaluated on a quarterly basis for a minimum of three years. If monitoring data shows an increase in contaminant levels over time, such that the asymptotic condition is significantly changed, active pumping will be resumed.

b. Passive Collection System Cleanup Levels (Influent Concentrations)

The management of migration objective of the passive collection system is to prevent degradation of the unnamed stream by collecting seeps and contaminated groundwater. Cleanup levels for the passive system will be based on Ambient Water Quality Standards (AWQS) and the designated uses of the receiving waters. EPA has selected AWQSs as cleanup levels because they are appropriate standards for the protection of aquatic life in the unnamed stream. EPA anticipates that either ambient water quality criteria for specific pollutants or bioassays will be used to determine compliance with Massachusetts water quality standards. Compliance with these cleanup levels will be measured at the influent to the treatment plant. Collected leachate and groundwater will be monitored before and after entering the groundwater treatment plant.

c. Effluent Concentration for Treatment Plant

Massachusetts ambient water quality standards (AWQSs) will also be used to set effluent limitations so that the discharge to the unnamed stream will not result in violations of the state's water quality standards. These standards include minimum criteria as well as narrative standards including "surface waters shall be free of toxic pollutants in toxic amounts." EPA anticipates that either ambient water quality criteria for specific pollutants or whole effluent toxicity limits will be specified as effluent limitations for the treatment plant's effluent. Based on the specific limits set for the effluent, appropriate monitoring requirements will also be specified, including bioassays. Specific effluent limits which comply with water quality standards and monitoring requirements will be determined during remedial design and will be based in part on the evaluation of predesign and pilot results. If at some point in the future it is determined to be more cost-effective to discharge to the New Bedford POTW, then the effluent limitations, as discussed above, will be amended to reflect pretreatment requirements.

C. Rationale for Selection

The choice of the selected alternative is based on the criteria listed in the evaluation of alternatives section of this document. In accordance with Section 121 of CERCLA, to be considered as a candidate for selection in the ROD, the alternative must be protective of human health and the environment and able to attain ARARs unless a waiver is granted. At the Sullivan's Ledge site, attainment of groundwater ARARs is technically impracticable from an engineering perspective, and a waiver from compliance with those ARARs is justified. In assessing the alternatives at this site, EPA focused on other evaluation criteria, including short term effectiveness, long term effectiveness, implementability, use of treatment to permanently reduce the mobility, toxicity, and volume of contaminants, and cost. EPA also considered nontechnical factors that affect the implementability of a remedy, such as state and community acceptance. Based upon this assessment, taking into account the statutory preferences of CERCLA, EPA selected the remedial approach for this site.

Alternative SA-5 represents the best combination of elements addressing contaminated soils, sediments and groundwater. The selected alternative is protective, effective in the long term and the short term, reduces the toxicity, mobility and volume of the contaminants, is implementable, has state and community acceptance and is cost-effective.

Most of the on-site soils are contaminated with PCBs, with approximately 24,000 cubic yards in excess of 50 ppm of PCBs. The clean-up level for sediments within the adjacent unnamed stream is less than 1 ppm. Therefore, for this site it is critical to ensure that on-site soils will not erode off-site into the unnamed stream. EPA has determined that solidification of the more highly contaminated soils and disposal under a cap is necessary to ensure that in the long term contaminated soils will not mobilize and erode off-site into the unnamed stream and is consistent with the preference for treatment as a principal element. Solidification also provides an added measure of security against possible future costs and remedial action necessary to protect human health and the environment if the cap were to fail. Excavation of contaminated sediments within the unnamed stream and water hazards is necessary to reduce the unacceptable environmental risk posed by such contaminated sediments for aquatic organisms and organisms at higher trophic levels. Solidification and on-site disposal for excavated sediments is the most cost-effective alternative considering the long term effectiveness and the significant reduction of mobility similar to other sediment treatment alternatives but at less cost, and the need to convert dewatered sediments into a suitable filler for disposal under a cap. As previously discussed, EPA has determined that it is technically impracticable, from an engineering perspective, to clean the contaminated groundwater to comply with drinking water standards. However, EPA has further determined that an active pumping collection system, located in close proximity to the pits, is required to significantly reduce the level of groundwater contaminants located in the on-site bedrock aquifer. In addition, because of unacceptable environmental risks due to contaminated groundwater and seeps discharging into the unnamed stream, a passive groundwater collection system is necessary for the short and long term during downtimes and upon successful completion of the active pumping system.

Other alternatives were considered less acceptable for the following reasons. Because Alternative SA-1, the no-action alternative, did not address risks from exposure pathways, it is not protective and was rejected from further consideration. All other alternatives included an element to reduce risks from exposure to contaminated soils. However, capping alone (Alternatives SA-2, SA-3) was not selected because it does not utilize treatment to reduce the toxicity, mobility, or volume of wastes, does not provide protection if the cap should fail and the long term effectiveness is less certain. Alternatives involving in-situ vitrification and incineration for soils (Alternatives SA-6 and SA-8) were rejected, even though the treatments would permanently destroy PCBs, because of implementability problems and substantially greater cost than solidification. Solidification was selected because it will reduce the mobility of PCBs and PAHs and will provide an extra measure of protection and long term effectiveness when used with a cap. Alternatives which did not address contaminated sediments (Alternatives SA-2, SA-3) were rejected because they do not reduce risks to aquatic and terrestrial organisms from exposure to contaminated sediments. Alternatives which did not utilize an active collection and treatment system to address groundwater contamination (Alternatives SA-2, SA-4, SA-6) were rejected because they are ineffective in the long term, do not significantly reduce the toxicity, mobility and volume of contaminants in the groundwater, and are not acceptable to the state. Alternatives which utilized an active collection and treatment system, but did not include a passive collection and treatment system (Alternatives SA-3, SA-7, SA-8), were rejected because they are not protective of the environment in the long term. Because it is technically impracticable to extract all pockets of contaminants located in the quarry pits and bedrock fractures, and an indeterminate amount of contaminants will therefore remain in the groundwater after the active collection and treatment system has been turned off, the passive collection system will be necessary to reduce environmental risks from exposure to groundwater seeps and/or further contamination of the unnamed stream and sediments.

XI. Statutory Determinations

A. The Selected Remedy is Protective of Human Health and the Environment

The remedy at this site will permanently reduce the risks posed to human health and the environment by exposure to contaminated soils, sediments, surface water and groundwater.

The soil cleanup levels to be attained by this remedy will reduce the risks from direct contact to and incidental ingestion of contaminated soils to a level protective of human health. In addition to solidification, construction of an impermeable cap over most of the surface area of the site will provide an additional barrier against exposure to contaminated soils by both human and environmental receptors. The combination of solidification and capping will also significantly reduce the potential for contaminated soils to migrate off-site via the unnamed stream. Periodic site visits and maintenance will be performed to ensure the integrity of the cap, and its effectiveness in preventing exposure to contaminated soils and wastes within the pits. Similarly, institutional controls will be implemented to regulate land use of the site, including activities which may compromise the integrity of the cap.

Treatment of the PCB-contaminated sediments in the unnamed stream and golf course water hazards will permanently and significantly reduce the risks to benthic organisms and organisms at higher trophic levels associated with contact with such sediments and subsequent bioaccumulation.

Risks from exposure to contaminated on-site overburden and bedrock groundwater and groundwater seeps will be permanently reduced. EPA has determined that it is technically impracticable to clean up the contaminated groundwater to drinking water standards, both on-site and immediately off the disposal site. However, attainment of groundwater cleanup goals, as measured by achievement of 1-10 ppm of total volatiles and/or an asymptotic curve using groundwater monitoring data, will result in a significant reduction of on-site groundwater contaminants. Groundwater within the zone of contamination is not currently used for drinking water sources. Institutional controls will be implemented to ensure that in the future, drinking water wells will not be drilled on- and off-site within the zone of groundwater contamination.

B. The Selected Remedy Attains ARARs

The remedy will meet or attain applicable or relevant and appropriate federal and state requirements that apply to the site, with the exception of requirements relating to groundwater, as discussed below. Federal environmental laws and regulations which are applicable or relevant and appropriate to the selected remedial action at the Sullivan's Ledge Site are:

Resource Conservation and Recovery Act (RCRA)
Toxic Substances Control Act (TSCA)
Clean Water Act (CWA)
Clean Air Act (CAA)
Occupational Safety and Health Administration (OSHA)
Safe Drinking Water Act (SDWA)
Department of Transportation Regulations

State environmental regulations which are applicable or relevant and appropriate to the selected remedial action at the site are:

Dept. of Environmental Quality Engineering (DEQE) Regulations
- Hazardous Waste Regulations
- Wetlands Protection Regulations
- Certification for Dredging and Filling in Waters
- Drinking Water Regulations
- Air Quality Standards
- Air Pollution Control Regulations

Massachusetts Division of Water Pollution Control (MDWPC) Regulations
- Surface Water Quality Standards
- Groundwater Quality Standards
- Supp. Requirements for Hazardous Waste Management Facilities

Table 3 provides a synopsis of the applicable or appropriate requirements for the selected remedy. A discussion of how the selected remedy meets those requirements follows.

Groundwater

Safe Drinking Water Act
Massachusetts DEQE Drinking Water Regulations
Massachusetts MDWPC Groundwater Quality Standards

The groundwater at Sullivan's Ledge, both on-site and immediately off-site, is not currently used as a drinking water source, but is a potential drinking water source. Maximum Contaminant Levels (MCLs) promulgated under the Safe Drinking Water Act and Massachusetts Drinking Water Standards, which regulate public drinking water supplies, are not applicable. However, because the groundwater could potentially be used as drinking water source, MCLs are relevant and appropriate. Minimum Groundwater Criteria established under the Massachusetts Groundwater Quality Standards are relevant and appropriate.

In this Record of Decision, EPA is waiving compliance with certain ARARs relating to groundwater. The waiver covers both federal and state ARARs. Specifically, the Maximum Contaminant Levels (MCLs) promulgated under the Safe Drinking Water Act, Massachusetts Drinking Water Standards and Massachusetts Groundwater Quality Standards are waived. EPA has determined that compliance with the requirements of these ARARs is technically impracticable from an engineering perspective. Accordingly, EPA is waiving these requirements pursuant to Section 121(d)(4)(C) of CERCLA, 42 U.S.C. § 9622(d)(4)(C).

The determination of technical impracticability is based primarily on the nature of the wastes and contaminants within the pits and along the bedrock fractures, and the geology of the site. EPA has concluded that the quarry pits and bedrock fractures contain dense non-aqueous phase liquids (DNAPLs), as a result of direct dumping of liquid wastes into the pits at depths approaching 150 feet into bedrock. The bedrock fractures are irregular both in length and orientation and as such cannot be accurately located, especially at such depths. In addition, DNAPLs will distribute along bedrock fractures under the influence of gravity, not just in the direction of flow, resulting in the inability to predict their locations even along a specific fracture. Therefore, the pockets of highly contaminated wastes located within the pits and along fractures cannot be cleaned up by conventional excavation and pumping methods as it is technically not possible to locate and extract all the contaminated pockets. The excavation of the quarry pits would also require an operation which is logistically infeasible to implement considering decontamination, staging and disposal constraints for the liquid wastes and solid objects within the pits. Even if the remedy did include excavation of the quarry pits, some contaminants would certainly remain in the pits and along the bedrock fractures.

Groundwater will be treated to the target levels discussed in Section X.B.3. The groundwater treatment facility will be located outside of the 100-year floodplain on the golf course, immediately adjacent to the disposal site. The location of the facility attains the siting requirements of MDWPC Supplemental Requirements for Hazardous Waste Management Facilities. There are no suitable areas on site for constructing the treatment facility, because quarry pits underlie much of the site and because construction of the facility may harm the cap. The proposed location is within the areal extent of contamination, and is considered to be part of the site for the purposes of Section 121(e) of CERCLA. Therefore, no permit is required. Discharges from the treatment facility into the unnamed stream or to the New Bedford sewer will attain ARARs, as described below.

<u>Soils and Sediments</u>

The applicable or relevant and appropriate requirements for the excavation, solidification and capping of the contaminated soils and sediments are regulations promulgated pursuant to TSCA, RCRA and DEQE Hazardous Waste Management Regulations.

<u>Toxic Substances Control Act</u>

The PCB Disposal Requirements promulgated under TSCA are applicable to the site because the selected remedy involves disposal of soils and sediments contaminated with PCBs in excess of 50 ppm. Under the Disposal Requirements, soils contaminated with PCBs may be disposed of in an incinerator, chemical waste landfill, or may be disposed of by an alternate method which is a destruction technology and achieves an equivalent level of performance to incineration. 40 C.F.R. §§ 761.60(a)(4), 761.60(e). In this case, placement of solidified soils and sediments on the top of the ground surface of the existing landfill and construction of an impermeable cap over 11 acres of the site will satisfy the requirements of a chemical waste landfill. The passive groundwater collection system will collect leachate and monitoring of groundwater wells will be instituted, as required by the chemical waste landfill regulations.

The Regional Administrator is exercising the waiver authority contained within the TSCA regulations at 40 C.F.R. § 761.75(c)(4), and is waiving certain requirements of the chemical waste landfill. The provisions to be waived require construction of chemical waste landfills in certain low permeable clay conditions [40 C.F.R. § 761.75(b)(1)], the use of a synthetic membrane liner [§ 761.75(b)(2)], and that the bottom of the landfill be 50 feet above the historic high water table [§ 761.75(b)(3)].

The Regional Administrator hereby determines that, for the following reasons, the requirements of 40 C.F.R. §§ 761.75(b)(1),(2) and (3) are not necessary to protect against an unreasonable risk of injury to health or the environment from PCBs in this case.

Low permeability clay conditions for the underlying substrate are not necessary at this site to prevent migration of PCBs. Soils and sediments over 50 ppm will be solidified and placed on top of the existing ground surface and clean fill. Solidification of soils with PCBs over 50 ppm and an impermeable cap will effectively encapsulate PCBs and prevent future migration. The requirement of a synthetic membrane liner is waived because there will be no hydraulic connection between the solidified mass and the groundwater or surface water. Although the water table at Sullivan's Ledge is five to ten feet below the ground surface, infiltration of PCBs to the groundwater will be prevented by binding the PCBs in a solidified mass and placing them under an impermeable cap. Also, installation of the active collection system and the cap may further lower the groundwater level. Surface erosion of PCBs in soils and transport of the soils into the unnamed stream will essentially be prevented by the combination of solidification and placement under an impermeable cap. The hydrologic requirement that the landfill must be fifty feet above the historic high water table is waived because it is extremely unlikely that the solidified soils and sediments will ever come in contact with the groundwater. The solidified materials will be placed on the ground surface, five to ten feet above the water table, and will not be located in a floodplain, shoreland or groundwater recharge area. These factors ensure that at this site there will not an unreasonable risk of injury to health and the environment if the above requirements are waived.

<u>Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act</u>

The Commonwealth of Massachusetts has been authorized by EPA to administer and enforce RCRA programs in lieu of the federal authority. Compliance with Massachusetts RCRA regulations is discussed below. However, federal regulations promulgated under the Hazardous and Solid Waste Amendments to RCRA (HSWA) are potentially applicable.

The applicability of HSWA regulations depends on whether the wastes are hazardous, as defined under RCRA.[4] In this case, certain compounds which may exhibit characteristics of hazardous waste, such as barium and lead, are present in some limited areas of the soils. However, HSWA regulations will not be applicable to those soils, because the Agency expects that after the soils are solidified, they will no longer exhibit any characteristics of hazardous wastes. Accordingly, HWSA land disposal restrictions will not be applicable because placement of the solidified soils on the land will not constitute disposal of a hazardous waste.[5]

The minimum technology standards for landfills promulgated pursuant to HSWA are not applicable, because the Sullivan's Ledge site is an existing landfill, rather than a new landfill, a lateral expansion, or a replacement landfill. Furthermore, the double liners required under these standards are not relevant and appropriate to this site. Because contaminants exist deep within the quarry pits and in the bedrock fractures, it is technically infeasible to build double liners that would prevent contaminants from coming into contact with groundwater. Accordingly, bottom double liners would not serve the purpose of isolating contaminants from the groundwater. Leachate collection requirements are relevant and appropriate, with the exception of the length of operation requirement. The passive groundwater collection system will collect leachate until Massachusetts water quality standards are achieved.

---

[4] The agency has determined that none of the wastes in the soils and sediments at Sullivan's Ledge are listed hazardous wastes under RCRA because the specific processes creating the wastes are unknown. The mere presence of a hazardous constituent in a waste is not sufficent to consider the waste a RCRA listed waste.

[5] HSWA land disposal restrictions (LDR) would be applicable to the disposal of those portions of the soils contaminated with RCRA hazardous waste if they also contain certain restricted wastes. Under LDR, if soils contaminated with a RCRA hazardous waste (such as lead) also contain halogenated organic compounds such as PCBs in excess of 1,000 ppm, they must be incinerated prior to land disposal. At Sullivan's Ledge, it appears that the soils with high lead content do not also contain PCBs greater than 1000 ppm. Even if that were the case, incineration would not be appropriate because of the high lead content, and EPA would invoke a variance from the treatment standard pursuant to 40 CFR § 268.44, allowing treatment of the lead- and PCB-contaminated soils by solidification.

Massachusetts DEQE Hazardous Waste Regulations

Massachusetts' DEQE Hazardous Waste Regulations are relevant and appropriate to this site, because the wastes to be managed are either hazardous wastes or are similar to hazardous wastes.[4]

The placement of contaminated soils and sediments under a cap will occur outside the 100-year floodplain, in accordance with location standards in the Massachusetts Hazardous Waste Regulations. Massachusetts closure and post-closure requirements requiring, among other things, that a cap attain a certain low permeability standard and act to minimize migration of liquids through the landfill in the long term will be attained. In addition, the substantive elements of the contingency plan, emergency procedures, preparedness and safety requirements will be satisfied.

The portion of the DEQE landfill regulations requiring a double liner is not appropriate to the site and will not be attained. Large volumes of wastes will be left in the quarry pits underlying the solidified material, because of the impracticability of excavation, as described above. Thus, placement of a double liner over the wastes in the quarry pits would be ineffective in containing the wastes. Leachate collection requirements are relevant and appropriate, with the exception of length of operation requirements. The passive system will collect leachate and will operate until water quality standards are achieved.

The groundwater monitoring program will comply with the groundwater protection regulations under the DEQE regulations, with the possible exception of semi-annual monitoring. As currently conceived, the remedy calls for groundwater monitoring quarterly during the first three years, and the frequency thereafter will be finalized during remedial design. Semi-annual monitoring requirements may not be appropriate to this site,

---

[4] Massachusetts Hazardous Waste Regulations are not applicable, because the remedial action implementing this Record of Decision will be initiated or ordered by DEQE as well as EPA. In such circumstances, no license pursuant to the Massachusetts hazardous waste statute and DEQE hazardous waste regulations is required. 310 C.M.R. 30.801(11). Accordingly, DEQE does not require strict compliance with all hazardous waste regulations for such remedial actions, but only requires compliance with the relevant and appropriate substantive sections of those regulations.

where the primary purpose of groundwater monitoring is not to check the effectiveness of the cap, but to assess the effectiveness of the groundwater extraction and treatment program.

Surface Water

Clean Water Act

Some regulations under the Clean Water Act are applicable to the discharge of treated waters to the surface waters of the unnamed stream. No permit is required under the NPDES program for this discharge, because the effluent from the treatment facility will be discharged directly into the unnamed stream at a point considered part of the CERCLA site. EPA has selected a treatment method combining chemical oxidation/filtration for metals removal and UV/ozonation for organics removal which will be capable of achieving state water quality standards. Pilot testing of the treatment system will be conducted as part of the remedial action.

If the City of New Bedford builds a secondary treatment plant (POTW) at some point in the future, EPA may discharge groundwater collected by the passive system indirectly to the POTW through the sewer. In that case, EPA would comply with pretreatment requirements of the Clean Water Act. These regulations contain general prohibitions against interfering with the operation of a POTW and against pass-through of pollutants, and specific prohibitions against introducing pollutants that will create a fire or explosion hazard, or cause corrosive structural damage to the POTW, among other things.

Massachusetts Surface Water Quality Standards

Massachusetts water quality standards for discharge to surface waters are applicable to discharges to the unnamed stream. The unnamed stream is classified as Class B, for the uses and protection of propagation of fish, aquatic life and wildlife, and for primary and secondary contact recreation. Massachusetts standards state that water shall be free from pollutants that exceed the recommended limits, that are in concentrations injurious or toxic to humans, or that exceed site-specific safe exposure levels determined by bioassay using sensitive species. At Sullivan's Ledge, these standards will be attained by using either ambient water quality standards or whole effluent toxicity limits. Bioassay tests may also be performed to determine site-specific safe exposure levels. Because the effluent from the treatment facility will be discharged directly into the unnamed stream at a point considered part of the site, no permit is required.

Floodplains and Wetlands ARARs

Regulations under Section 404 of the Clean Water Act are applicable, because channelization and lining of the unnamed stream and construction of roads in the wetlands will involve a discharge of dredged or fill material. The Agency has determined that in this case there is no other practicable alternative which would address PCB contamination in sediments but which would also have a less adverse impact on the aquatic ecosystem. The selected remedy will comply with the substantive requirements of Section 404 to minimize adverse impacts to the aquatic ecosystem, by creating sedimentation basins, by erecting baffles in the lined part of the stream, and by restoring the stream and wetlands.

In addition, the policies expressed in Executive Orders regarding wetlands and floodplains were taken into account in the selected remedy. The remedy will include steps to minimize the destruction, loss, or degradation of wetlands in accordance with Executive Order 11990, and will include steps to reduce the risk of floodplain loss in accordance with Executive Order 11988.

DEQE Wetlands Protection Regulations concerning dredging, filling, altering or polluting inland wetlands are applicable to the dredging of the unnamed stream and water hazards. The remedial action will comply with the performance standards of the regulations regarding banks, vegetated wetlands, and lands under water, and a one-for-one replication of any hydraulic capacity which is lost as the result of this part of the remedial action.

Because the stream and water hazards are within the areal extent of contamination, they are considered part of the site, and no permits will be necessary.

Air

Standards for particulate matter under the Clean Air Act and DEQE Air Quality and Air Pollution regulations are applicable and will be attained during construction phases.

OSHA/Right to Know

OSHA standards for general industries and health and safety standards will be attained. Informational requirements under the Massachusetts right to know regulations will be attained during implementation of the remedy.

Department of Transportation Regulations

Any hazardous wastes transported for off-site disposal, including any solids extracted during the groundwater treatment program, will be transported in accordance with Department of Transportation regulations.

C. The Selected Remedial Action is Cost Effective

Of those remedial alternatives that are protective and attain all technically practicable ARARs, EPA's selected remedy is cost-effective. As discussed in the FS, solidification is the most cost effective treatment alternative for soils and sediments, based on the treatment of equivalent volumes. In particular, the cost of on-site incineration is $13,500,000 (present worth) for treatment of soils with PCBs in concentrations equal to or greater than 50 ppm. This is $9,000,000 more than the cost of solidification for treatment of the same volume of soils. Although solidification is not a destruction technology, solidification and capping, in combination with a long-term maintenance program and institutional controls, will adequately protect human health and the environment over the short- and long-term. Because the site must be capped in any event to contain the wastes within the quarry pits, solidification of soils and sediments represents the most cost-effective treatment means of achieving the response objectives outlined in Section VIII A.

Present worth costs were estimated in the FS for four groundwater treatment technologies for the active collection system: air stripping with granular activated carbon (GAC), air stripping with GAC and vapor phase carbon, GAC alone and UV/ozonation. Of the four referenced treatment systems, UV/ozonation has the lowest cost estimate in present worth terms. Although GAC is a commonly used treatment for removal of VOCs, vinyl chloride, one of the contaminants of concern in the groundwater at the site, quickly exhausts the adsorptive capacity of GAC. UV/ozonation is a technology which has been proven to be effective in the destruction of organic contaminants in groundwater, including vinyl chloride. Therefore, the selection of UV/ozonation as a groundwater treatment system is the most cost-effective both in terms of its destruction efficiency and estimated cost.

Implementation of the active groundwater collection system will be required until the time that the levels which the Agency considers technically practicable, as described in Section X.B.3.a., are achieved. The combination of an active and passive groundwater collection system is cost-effective because it reduces the length of time of the operation of the active collection system. If no passive system were in place, it would be necessary to operate the active system until water quality standards were achieved in order to prevent degradation of the unnamed stream. Construction of the passive system represents a minimal portion of the total cost of the remedy.

D. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

EPA has determined that the solidification, capping, and groundwater treatment components of the selected remedy utilize permanent solutions to the maximum extent practicable.

In this case, it is technically impracticable from an engineering perspective to excavate all the wastes contained within the quarry pits and deep bedrock fractures, and therefore technically impracticable to eliminate permanently the source of groundwater contamination. All the source alternatives which EPA evaluated for complete and permanent remediation of wastes contained within the quarry pits were screened out in Chapter 9 of the FS, because of problems with their effectiveness, implementability and cost.

The determination that it is technically impracticable to excavate wastes in the quarry pits and bedrock fractures is based primarily on the nature of the wastes present and the geology of the site. The evidence indicates that the quarry pits and the bedrock fractures contain pockets of highly contaminated liquids. These pockets cannot be cleaned up by conventional excavation and pumping methods, as it is technically not possible to locate and extract all contaminated liquids. The excavation of the quarry pits would also require an operation which is logistically impracticable to implement, considering decontamination, staging and disposal of wastes and objects in the pits. Significant short term hazards may result from excavating large bulky objects such as cars and timbers which are significantly contaminated by the liquid wastes.

The remedy also uses alternate technologies. Solidification of soil and sediment is designated as an innovative treatment, as is UV/ozonation.

E. The Selected Remedy Satisfies the Preference for Treatment as a Principal Element

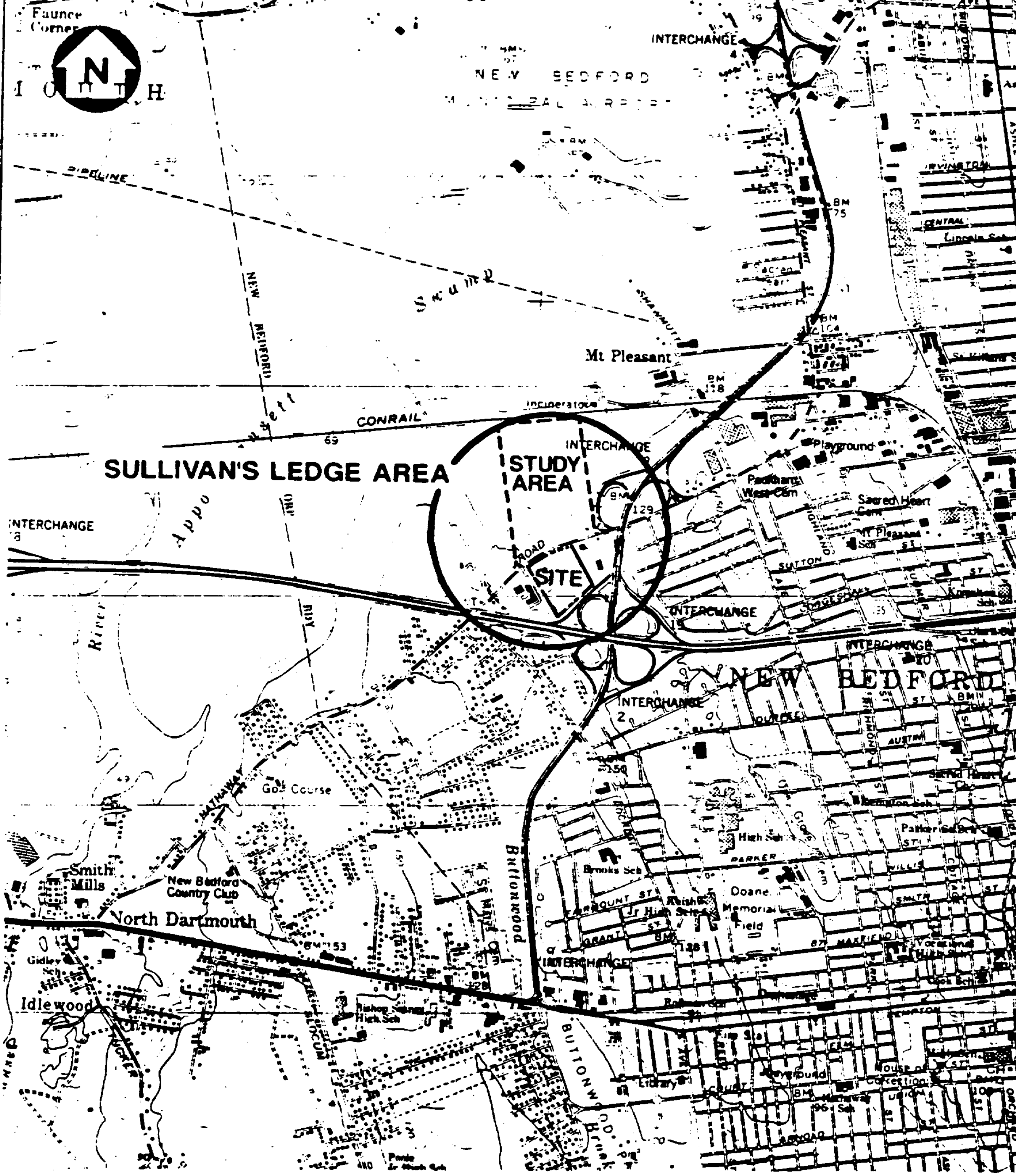
The selected remedy satisfies the statutory preference for treatment as a principal element by specifying excavation and solidification of contaminated soils and sediments equal to or above human health-based and environmental risk-based target levels. Solidification of contaminated soils and sediments is a form of treatment which significantly reduces the mobility of PCBs. Although not as permanent as destruction technologies, solidification provides more long term protection than capping alone.

The groundwater treatment system also utilizes treatment. As described in preceding sections, EPA has determined that it is technically impracticable, from an engineering perspective, to excavate and treat all the solid and liquid wastes within the quarry pits. However, since the liquid wastes within the pits constitute the primary threat to human health and the environment, the remedy specifies a groundwater extraction and treatment system located in close proximity to the pits in order to significantly reduce the mass of contaminants in groundwater. The groundwater treatment system of chemical precipitation followed by UV/ozonation will permanently destroy organic contaminants and remove metal contaminants from collected groundwater.

XII. STATE ROLE

The Massachusetts Department of Environmental Quality Engineering (MA DEQE) has reviewed the various alternatives and has indicated its support for the selected remedy. The State has also reviewed the Remedial Investigations and the Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate State environmental laws and regulations. MA DEQE concurs with the selected remedy for the Sullivan's Ledge Site. A copy of the declaration of concurrence is attached as Appendix C.

Because the City of New Bedford, a political subdivision of the Commonwealth of Massachusetts, operated the site at the time of disposal of hazardous substances, the state is responsible for a minimum of 50 percent of the sums expended in response to releases at the site, in accordance with Section 104(c)(3) of CERCLA. In the case of the selected remedy, the Commonwealth's minimum share is estimated at approximately $5,050,000.

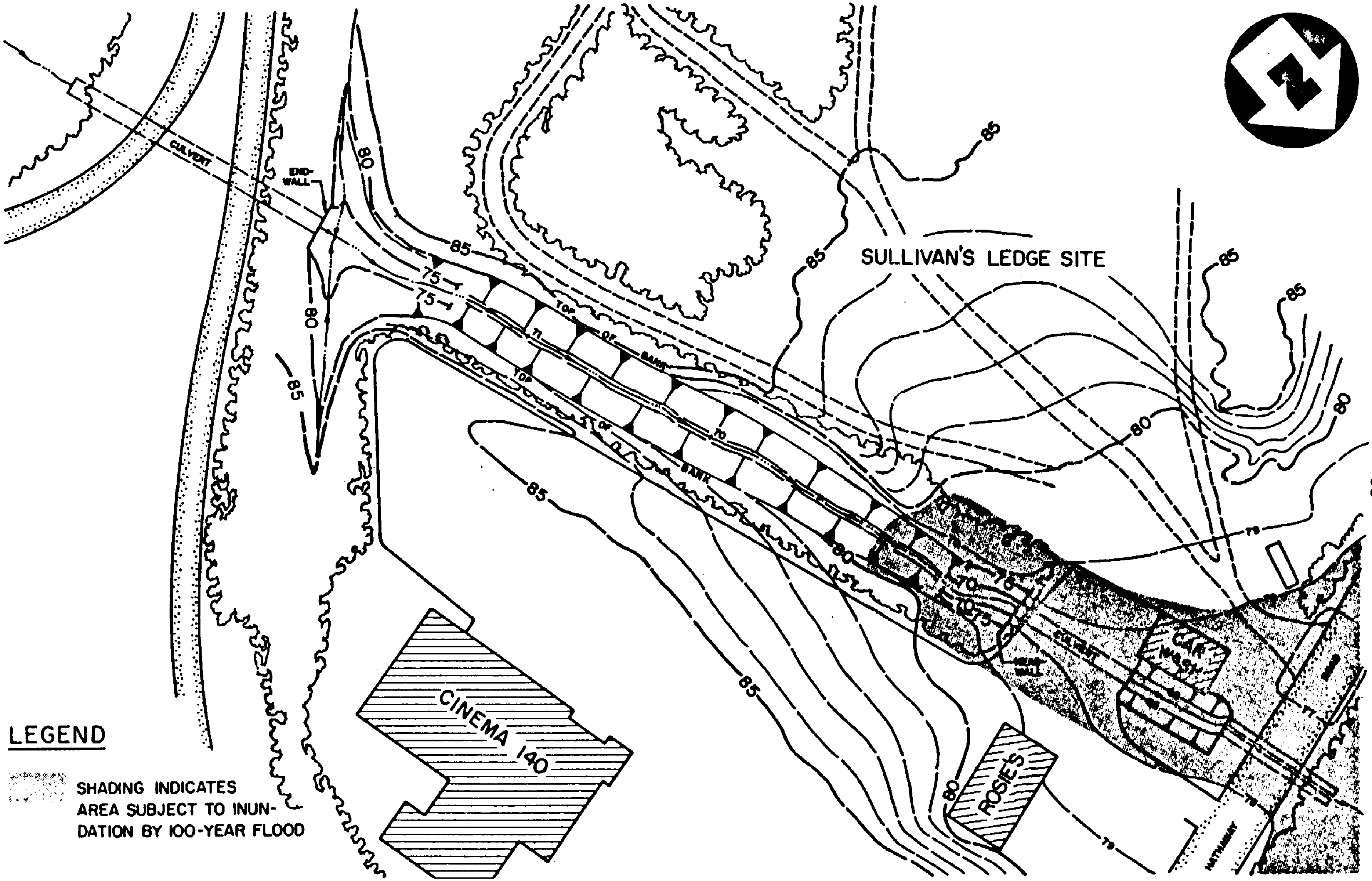


BASE MAP SOURCE: USGS QUADRANGLE, 7.5 MINUTE SERIES
NEW BEDFORD NORTH, MA.

SCALE: 1"=2083'

FIGURE 1
SITE LOCATION MAP
SULLIVAN'S LEDGE SITE
NEW BEDFORD, MASSACHUSETTS

5180-03



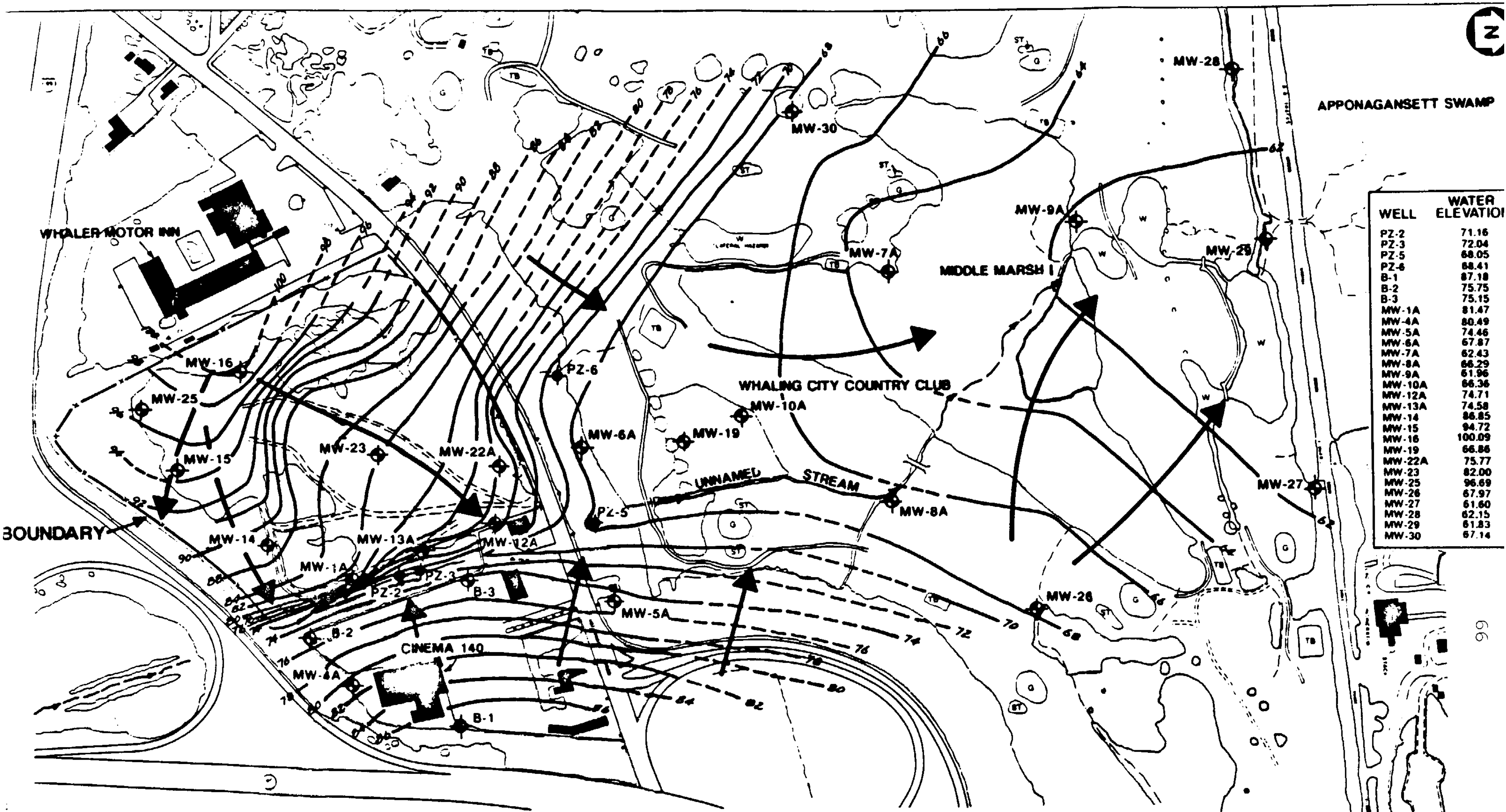
LEGEND

SHADING INDICATES AREA SUBJECT TO INUNDATION BY 100-YEAR FLOOD

FIGURE 2

FLOOD STAGE MAP (100-YEAR FLOOD)
SULLIVAN'S LEDGE SITE, NEW BEDFORD, MA
SCALE 1" = 100'

Delineation of 100-year Flood Plan



WELL	WATER ELEVATIO[N]
PZ-2	71.16
PZ-3	72.04
PZ-5	68.05
PZ-6	68.41
B-1	87.18
B-2	75.75
B-3	75.15
MW-1A	81.47
MW-4A	80.49
MW-5A	74.46
MW-6A	67.87
MW-7A	62.43
MW-8A	66.29
MW-9A	61.96
MW-10A	66.36
MW-12A	74.71
MW-13A	74.58
MW-14	86.85
MW-15	94.72
MW-16	100.09
MW-19	66.86
MW-22A	75.77
MW-23	82.00
MW-25	96.69
MW-26	67.97
MW-27	61.60
MW-28	62.15
MW-29	61.83
MW-30	67.14

...URS ARE BASED UPON GROUNDWATER MEASUREMENTS ...ON OR ABOUT FEBRUARY 26, 1988. INTERPRETATIONS ...ASED ON AVAILABLE DATA, HOWEVER ACTUAL ...TIONS MAY VARY FROM THOSE INDICATED ABOVE

LEGEND

- BUILDING
- CONTROL POINT
- DRAINAGE
- FOOT BRIDGE
- G GREEN
- POSS DRAINAGE
- ×310.1 SPOT ELEVATION
- 80 GROUNDWATER SURFACE CONTOUR (DASHED WHERE INFERRED)
- INTERPRETIVE GROUNDWATER FLOW DIRECTION
- ST SAND TRAP
- TB TEE BOX
- TREES
- UNIMPROVED ROAD
- UTILITY POLE
- W POND/IMPOUNDMENT
- PIEZOMETER LOCATION
- MONITORING WELL LOCATION

0 250 500 FEET

FIGURE 3
INTERPRETIVE GROUNDWATER SURFACE CONTOURS IN OVERBURDEN
SULLIVAN'S LEDGE SITE
NEW BEDFORD, MASSACHUSETTS

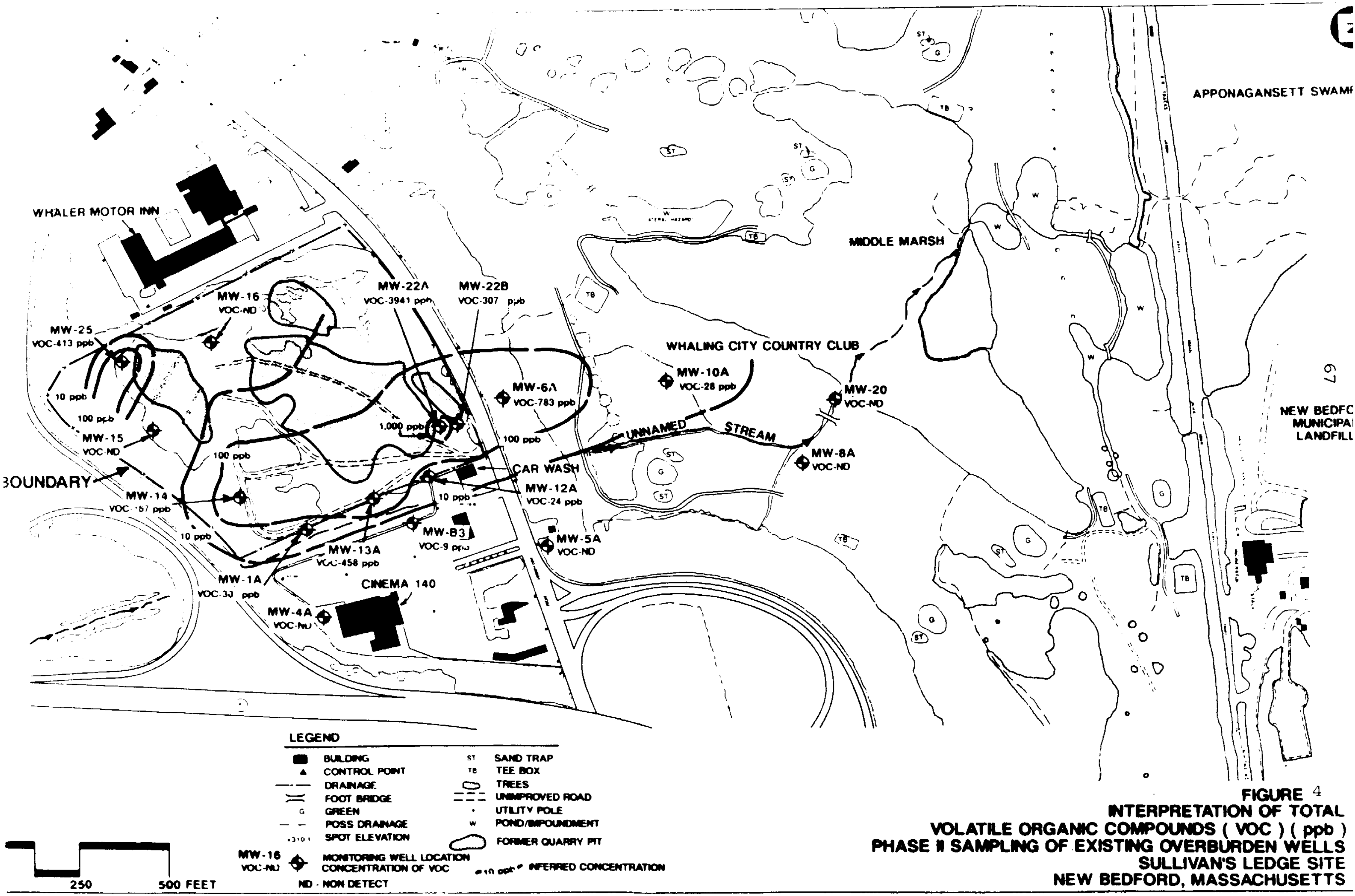


FIGURE 4
INTERPRETATION OF TOTAL VOLATILE ORGANIC COMPOUNDS (VOC) (ppb)
PHASE II SAMPLING OF EXISTING OVERBURDEN WELLS
SULLIVAN'S LEDGE SITE
NEW BEDFORD, MASSACHUSETTS

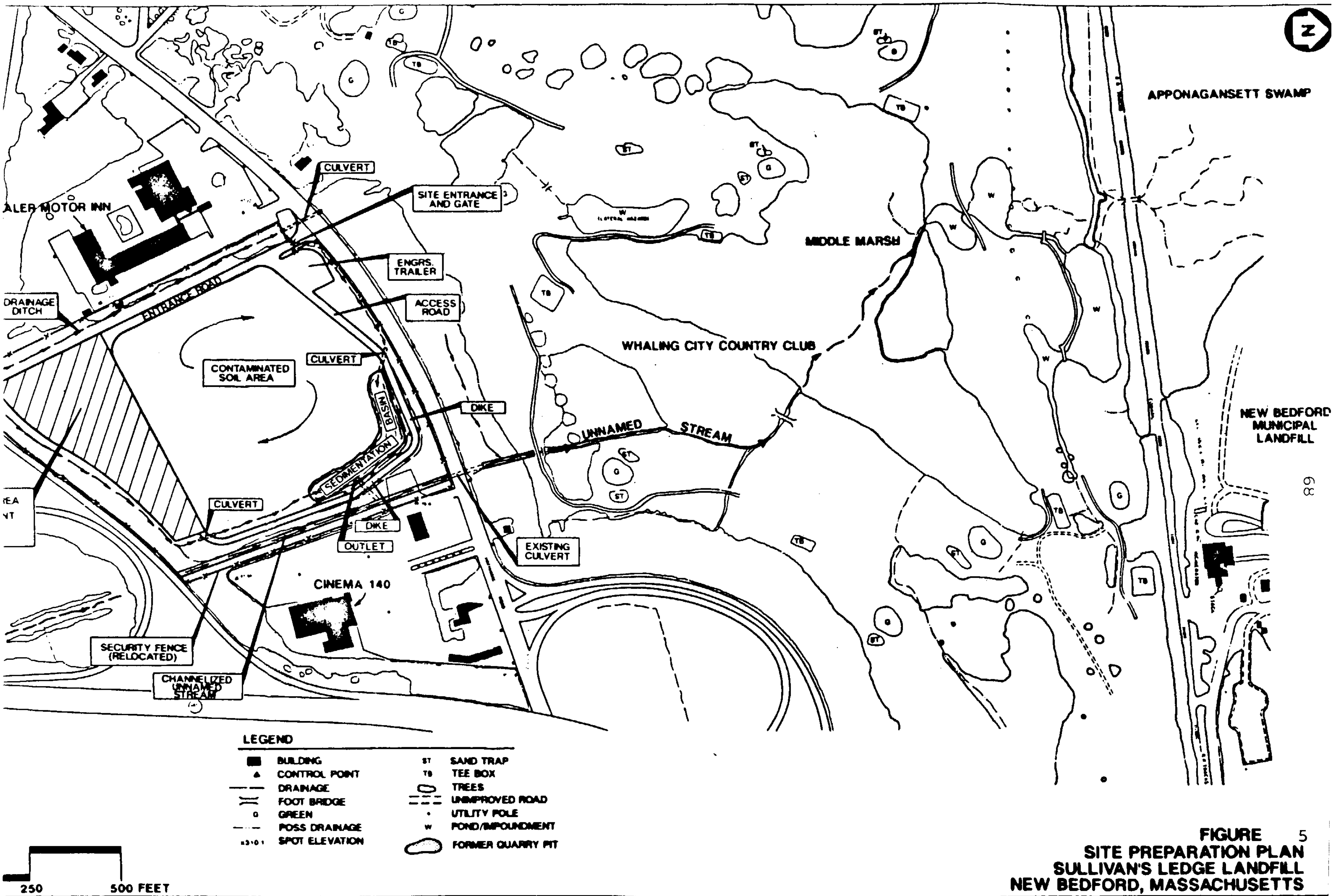


FIGURE 5
SITE PREPARATION PLAN
SULLIVAN'S LEDGE LANDFILL
NEW BEDFORD, MASSACHUSETTS

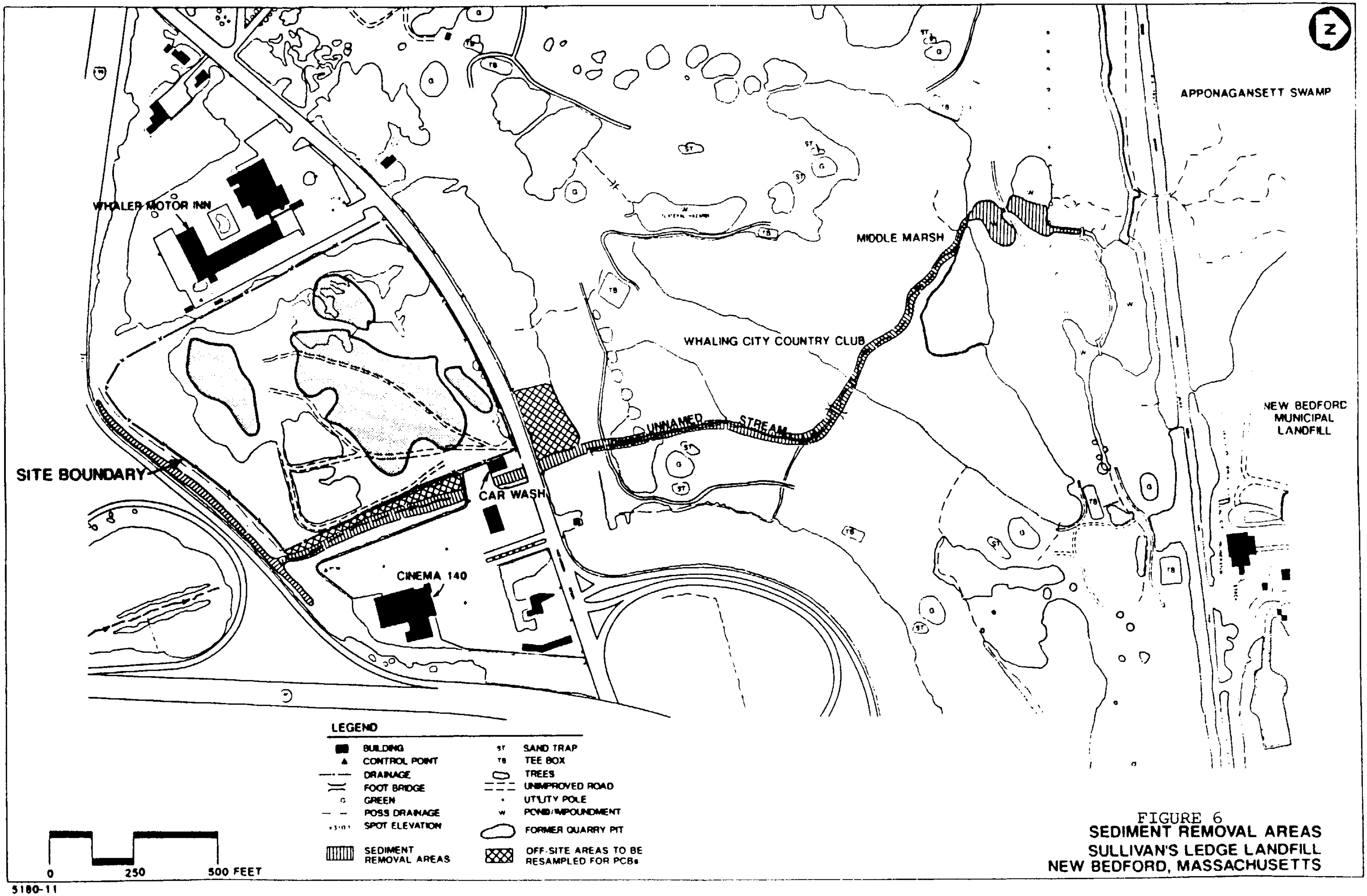


FIGURE 6
SEDIMENT REMOVAL AREAS
SULLIVAN'S LEDGE LANDFILL
NEW BEDFORD, MASSACHUSETTS

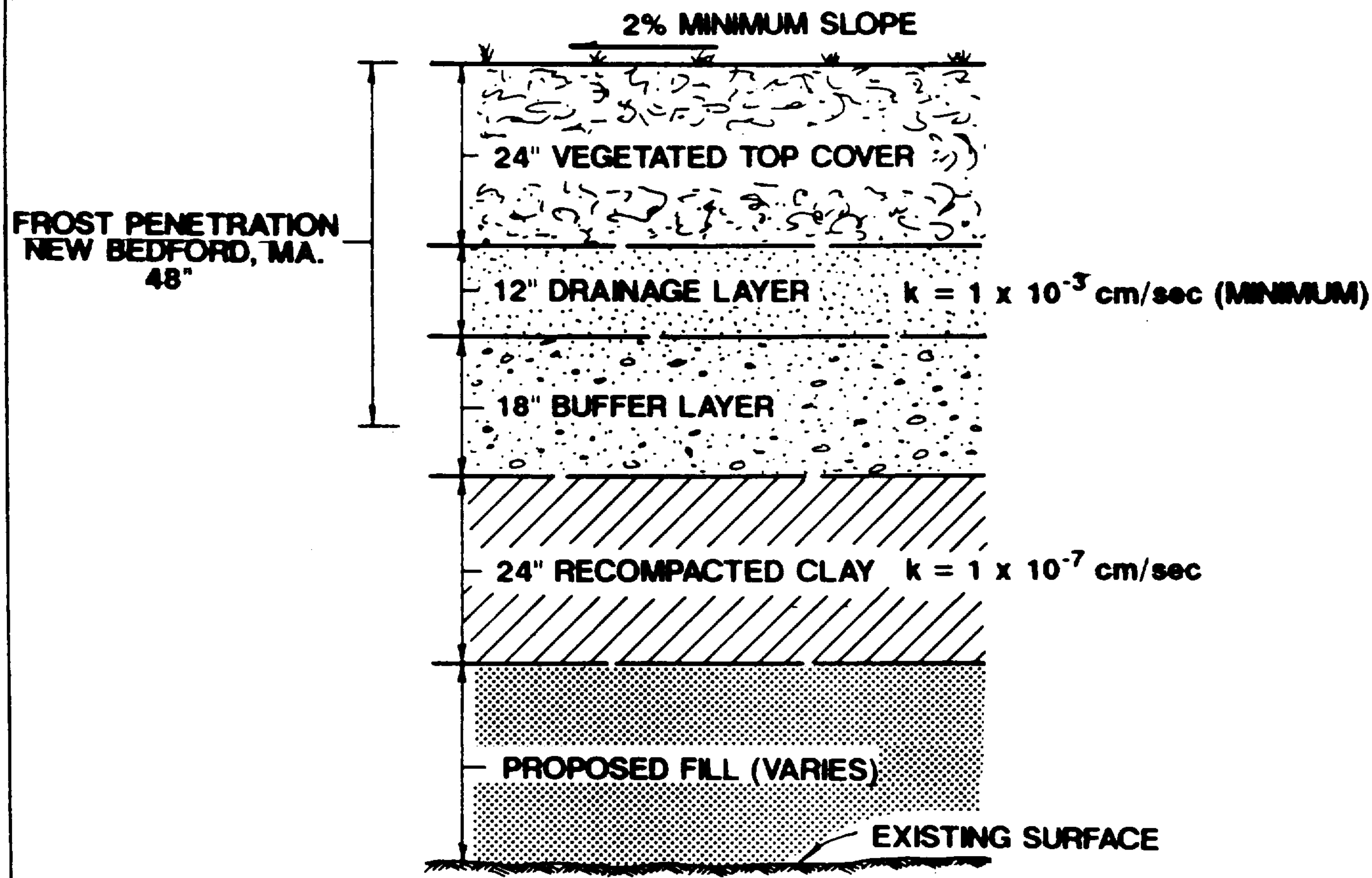


FIGURE 7
PROPOSED CAP DESIGN

SULLIVAN'S LEDGE SITE
NEW BEDFORD, MASSACHUSETTS

5180-11

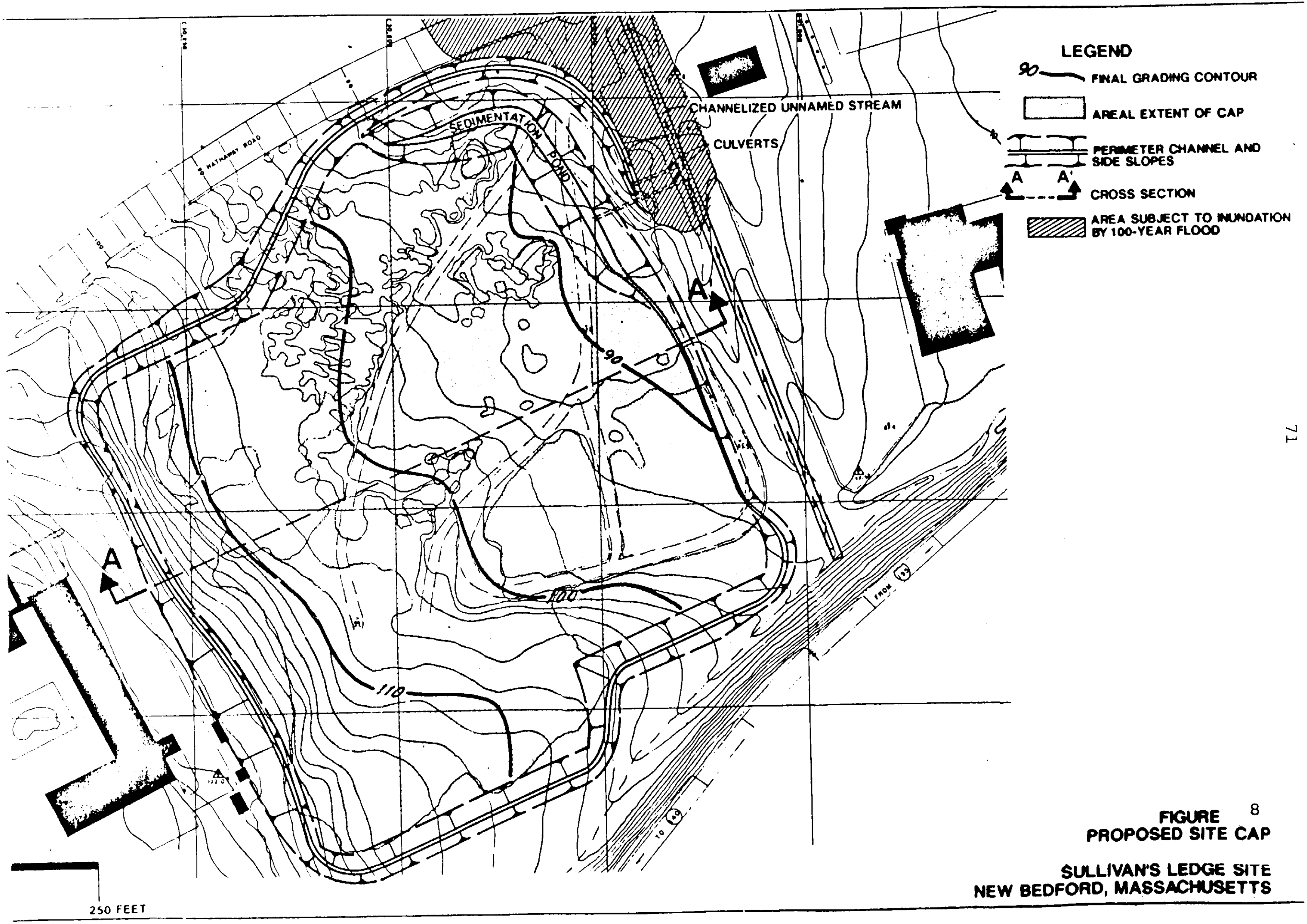


FIGURE 8
PROPOSED SITE CAP

SULLIVAN'S LEDGE SITE
NEW BEDFORD, MASSACHUSETTS

TABLE 1

INDICATOR COMPOUNDS
SULLIVAN'S LEDGE SITE
NEW BEDFORD, MASSACHUSETTS

VOLATILE ORGANICS

2-butanone
4-methyl-2-pentanone
benzene
toluene
xylenes
ethylbenzene
chlorobenzene
1,2-dichloroethane
trans-1,2-dichloroethene
trichloroethene
vinyl chloride
chloroform
methylene chloride
styrene

SEMI-VOLATILE ORGANICS

Acid Extractables

Pentachlorophenol

Base/Neutral Extractables

bis(2-ethylhexyl)phthalate
polycyclic aromatic hydrocarbons (PAHs)
- acenapthane
- acenapthylene
- anthracene
- benzo(a)anthracene
- benzo(b)fluoranthene
- benzo(k)fluoranthene
- benzo(g,h,i)perylene
- benzo(a)pyrene
- chrysene
- dibenzo(a,h)anthracene
- fluoranthene
- fluorene
- ideno(1,2,3-cd)pyrene
- phenanthrene
- pyrene
- naphthalene
- 2-methylnaphthalene
- 2-chloronaphthalene

1,2-dichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene
1,2,4-trichlorobenzene
n-nitrosodimethylamine
n-nitrosodiphenylamine
bis(2-chloroethyl)ether
dibenzofuran

Table 1 continued

INDICATOR COMPOUNDS
SULLIVAN'S LEDGE SITE
PAGE TWO

PESTICIDES/PCBs

PCB-1016	PCB-1248
PCB-1221	PCB-1254
PCB-1232	PCB-1260
PCB-1242	

INORGANICS

barium	silver
copper	sodium
iron	zinc
lead	
manganese	
mercury	
nickel	

TABLE 2

SUMMARY OF SOURCE CONTROL ALTERNATIVES SCREENING
SULLIVAN'S LEDGE SITE
NEW BEDFORD, MASSACHUSETTS

ALTERNATIVE DEVELOPMENT (SECTION 9.1)		ALTERNATIVE(S) ELIMINATED DURING COMPATIBILITY (SECTION 9.2)	ALTERNATIVES ELIMINATED DURING SCREENING OF (SECTION 9.3)	ALTERNATIVES REMAINING FOR DETAILED EVALUATION
SC-Soils-1	No Action	SC-Soils-1*		SC-1*
SC-Soils-2	Containment			SC-Soils-2
SC-Soils-3	In-situ Vitrification			SC-Soils-3
SC-Soils-4	Off-site RCRA Landfill	SC-Soils-4		
SC-Soils-5	On-site Incineration			SC-Soils-5
SC-Soils-6	Off-site Incineration		SC-Soils-6	
SC-Soils-7	KPEG/Thermal Aeration		SC-Soils-7	
SC-Soils-8	Solidification/on-site Disposal			SC-Soils-8
SC-Pits-1	No Action	SC-Pits-1*		
SC-Pits-2	Containment		SC-Pits-2	
SC-Pits-3	In-situ Biological		SC-Pits-3	
SC-Pits-4	Off-site RCRA Landfill		SC-Pits-4	
SC-Pits-5	Solidification/Off-site Landfill		SC-Pits-5	
SC-Pits-6	On-site Incineration		SC-Pits-6	
SC-Pits-7	Off-site Incineration		SC-Pits-7	
SC-Sed-1	No Action	SC-Sed-1*		
SC-Sed-2	Containment		SC-Sed-2	
SC-Sed-3	In-situ Biological		SC-Sed-3	
SC-Sed-4	Excavation/On-site Disposal		SC-Sed-4	
SC-Sed-5	Solidification/On-site Disposal			SC-Sed-5
SC-Sed-6	On-site Incineration			SC-Sed-6

*Note: SC-Soils-1, SC-Pits-1, SC-Sed-1, Combined to SC-1

TABLE 2 continued

SUMMARY OF MANAGEMENT OF MIGRATION ALTERNATIVES SCREENING
SULLIVAN'S LEDGE SITE
NEW BEDFORD, MASSACHUSETTS

ALTERNATIVE DEVELOPMENT (SECTION 9.1)		ALTERNATIVE ELIMINATED DURING COMPATIBILITY (SECTION 9.2)	ALTERNATIVES ELIMINATED DURING SCREENING OF (SECTION 9.3)	ALTERNATIVES REMAINING FOR DETAILED EVALUATION
MM-1	No Action			MM-1
MM-2	Containment	MM-2		
MM-3	Passive Collection			MM-3
MM-4	Groundwater Diversion		MM-4	
MM-5	Active Collection - Overburden and Bedrock Groundwater			MM-5
MM-6	Action Collection - Deep Bedrock Fracture Groundwater		MM-6	

Table 3 - ARARs

REQUIREMENT	REQUIREMENT SYNOPSIS/CONSIDERATION
Safe Drinking Water Act Regulations, 40 CFR Part 141, Subpart B	Establishes MCLs for public drinking water supplies. These relevant and appropriate regulations will be waived because of technical impracticability.
TSCA PCB Disposal Requirements, 40 CFR §§ 761.60	Disposal of soils and sediments with PCBs over 50 ppm, must be by incinerator or equivalent alternative method, or chemical waste landfill. Remedy will result in chemical waste landfill containing existing wastes which have been previously landfilled on site and solidified soils and sediments. Some requirements of chemical waste landfill which are not necessary to protect against risk of injury to health or environment will be waived under the waiver provisions of the TSCA regulations.
RCRA Land Disposal Regulations, 40 CFR § 268 Subpart C	These regulations are not applicable because solidified soils are not expected to contain characteristic or listed hazardous waste.
RCRA Minimum Technology Regulations, 40 CFR § 264.300	These regulations establish standards for new or replacement landfills, or lateral expansions of landfills, including double liner and leachate collection. Not applicable because remedy does not involve creation of new or replacement landfill, or lateral expansion of landfill. Double liners are not relevant and appropriate because it is technically infeasible to construct a double liner separating wastes in quarry pits from the groundwater. Remedy will comply with leachate collection requirements, except inappropriate length of operation requirements.

Surface Water Discharge Regulations, 40 CFR §§ 122, promulgated pursuant to Clean Water Act	Applicable to discharge of groundwater treatment system effluent. If effluent is discharged to surface waters, regulations will be attained through compliance with state water quality standards, and monitoring of discharge.
Pretreatment Regulations for Indirect Discharges to POTWs, 40 CFR Part 403	These regulations control the discharge of pollutants into POTWs, including specific and general prohibitions. If groundwater from passive collection system is discharged to sewer after New Bedford secondary treatment plant becomes operational, these regulations will be applicable, and the remedy will comply through pretreatment.
Discharge of Dredged and Fill Materials Regulations, 40 CFR §§ 230, promulgated under Section 404 of Clean Water Act	This regulation applies to the use of fill material in stream and wetlands. Remedy will comply because there is no practicable alternative having a less adverse impact on aquatic organisms, and steps will be taken to minimize adverse impacts, such as sedimentation basins, baffles and stream and wetlands restoration.
National Ambient Air Quality Standards (NAAQS), 40 CFR § 50.6, promulgated pursuant to Clean Air Act	These applicable regulations set primary and secondary 24-hour concentrations for emissions of particulate matter. Fugitive dust from excavation, treatment, solidification and disposal will be maintained below these standards, by dust suppressants if necessary.
OSHA Worker Safety Regulations, 29 CFR Part 1910	These applicable regulations contain safety and health standards that will be met during all remedial activities, including construction of the cap and installation of groundwater wells.
Department of Transportation Regulations for Transport of Hazardous Materials, 49 CFR Parts 107, 171.1-172.558	Requirements for transporting hazardous materials off-site will be met.

Massachusetts DEQE Drinking Water Regulations, 310 CMR 22	Establishes maximum contaminant levels for public drinking water supplies. Attainment of this relevant and appropriate regulation will be waived because of technical impracticability.
Massachusetts MDWPC Groundwater Standards, 314 CMR 6	Establishes minimum groundwater criteria. Attainment of this relevant and appropriate regulation will be waived because of technical impracticability.
Massachusetts DEQE Hazardous Waste Closure and Post Closure Regulations, 310 CMR §§ 30.580 and 30.590	The closure and post closure regulations are relevant and appropriate. The cap will be constructed and maintained and monitoring will be performed in compliance with these requirements.
Massachusetts DEQE Hazardous Waste Location Regulations, 310 CMR 30.700	The cap will be constructed outside the 100-year floodplain in accordance with these relevant and appropriate regulations.
Massachusetts DEQE Hazardous Waste Groundwater Protection Regulations, 310 CMR 30.660	The groundwater monitoring requirements are relevant and appropriate. Semi-annual monitoring for specified indicators of hazardous constituents are required to verify the effectiveness of closure. The remedy will comply with the substantive requirements, except that monitoring will be quarterly for the first three years and the frequency will be reevaluated thereafter.
Massachusetts DEQE Hazardous Waste Landfill Regulations, 310 CMR 30.620	Landfill requirements include double liners, leachate collection systems, and technical requirements for cap. Double liner requirements are not appropriate to this site, since groundwater below landfill will remain contaminated. Other requirements are relevant and appropriate and will be attained, except that leachate collection may be terminated prior to 30 years after closure, if target levels for the passive system have been achieved.
Massachusetts MDWPC Supplemental	RCRA facilities subject to surface water discharge requirements must also comply

Requirements for Hazardous Waste Management Facilities, 314 CMR 8	with DEQE regulations regarding location, technical standards for landfills, closure and post-closure, and management standards.
Massachusetts MDWPC Surface Water Quality Standards, 314 CMR 4	Surface waters must be free from pollutants which are present in toxic amounts, which exceed recommended limits for most sensitive use, or which exceed safe exposure levels. These applicable standards will be attained during remedial design and operation of the treatment system.
Massachusetts DEQE Wetlands Protection Regulations, 314 CMR 10	This applicable regulation sets performance standards for dredging banks, vegetated wetlands, and lands under water. The remedy and mitigative measures will attain these standards.
Massachusetts DEQE Ambient Air Quality Standards, 310 CMR 6, and DEQE Air Pollution Control Regulations, 310 CMR 7	This applicable regulation sets primary and secondary standards for emissions of particulate matter. These standards will be met during implementation.
Massachusetts Right to Know Regulations	Informational requirements of these regulations will be attained during implementation.

<u>Standards to be Considered</u>

Executive Orders 11990 and 11988	These executive orders regarding protection of floodplains and wetlands were considered in the evaluation and development of remedial alternatives . The soil and sediment excavation and stream lining will be conducted in such a manner to avoid or minimize adverse impacts.
Interim Sediment Quality Criteria	Interim sediment quality criteria were considered in establishing target levels for cleanup of sediments.